International General Certificate of Secondary Education

UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

PHYSICS 0625/5

PAPER 5 Practical Test

MAY/JUNE SESSION 2000 1 hour 15 minutes

Candidates answer on the enclosed answer booklet.
Additional materials:
As listed in Instructions to Supervisors
Electronic calculator and/or Mathematical tables
300 mm rule

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer booklet.

Answer **all** questions.

Write your answers in the spaces provided on the answer booklet.

You are expected to record all your observations as soon as these observations are made. These observations and any arithmetical working of the answers from them should be written in the answer booklet; scrap paper should **not** be used.

An account of the method of carrying out the experiments is **not** required but you should record any precautions you take, and it must be clear (by diagrams or otherwise) how the readings were obtained. The theory of the experiments is **not** required.

At the end of the examination, hand in only the answer booklet.

INFORMATION FOR CANDIDATES

Graph paper is provided in the enclosed answer booklet. Additional sheets of graph paper should be used only if it is necessary to do so.

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1 In this experiment you are to investigate the effect on a thermometer of blackening the bulb.

Record all of your observations and answers on pages 2 and 3 of the Answer Booklet.

Two thermometers, **A** and **B** (with a blackened bulb), have been set up for you. You should not change the position of the thermometers or the lamp. Each one is 1 cm from the lamp. Do not remove the screen from its position in front of the lamp – it is to prevent you being dazzled as you take temperature readings.

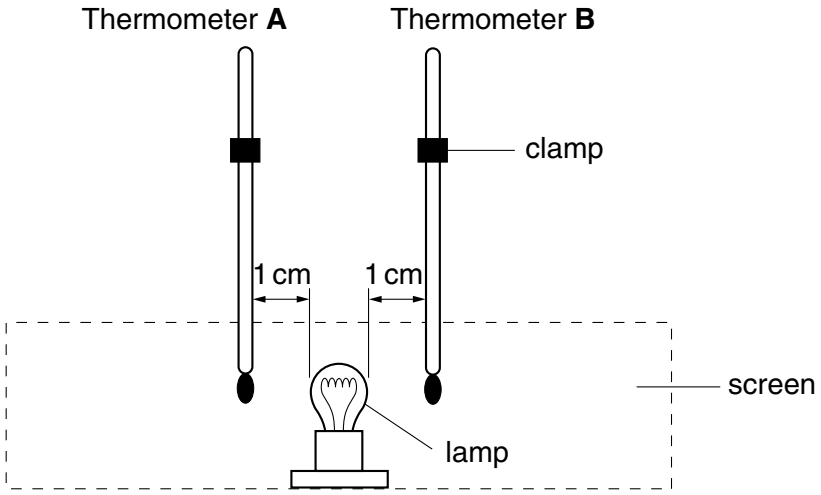

Fig. 1.1

Carry out the following instructions referring to Fig. 1.1. Record all temperatures to the nearest 1 °C.

(a) Measure room temperature with each of the thermometers and record the two values in the table for time 0 s.

(b) Switch on the lamp. Record the temperature shown on each thermometer after 30 seconds.

(c) Continue recording the temperature readings every 30 seconds for a total of 180 seconds.

(d) Suggest a conclusion for this experiment, justifying your conclusion by reference to your table of readings.

(e) Using the readings for thermometer **B** only, plot the graph of temperature/°C (*y*-axis) against time/s (*x*-axis) on the graph grid on page 3 of your Answer Booklet. Draw the best-fit curve.

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2 In this experiment you are to find the density of a sample of plasticine.

Record all of your observations and answers on pages 4 and 5 of your Answer Booklet.

Carry out the following instructions, referring to Fig. 2.1 and Fig. 2.2.

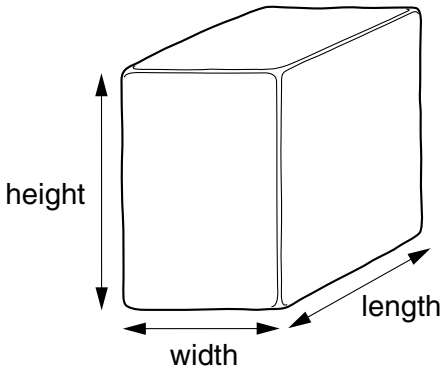

Fig. 2.1

(a) Using the rule, measure the length, height and width of the block of plasticine.

(b) Calculate the volume of the block, using the following equation:

volume = length x height x width.

(c) Place the metre rule on the pivot so that the 50 cm mark is directly over the pivot, as shown in Fig. 2.2.

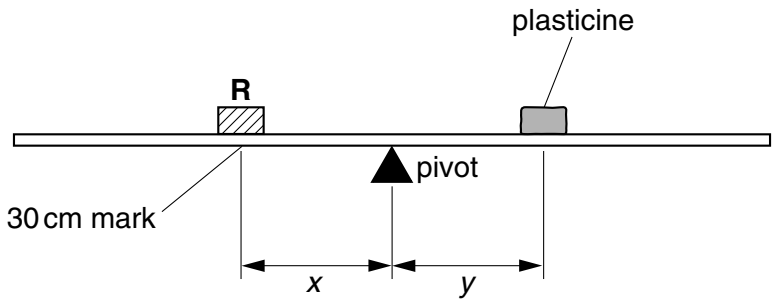

Fig. 2.2

Place the load **R** on the metre rule so that its centre is above the 30 cm mark. Record x, the distance from the 30 cm mark to the pivot. (The first value x = 20.0 cm has been recorded for you.)

Place the plasticine on the metre rule and move it until the rule balances (do not change the position of **R** or of the pivot). Measure and record y, the distance between the pivot and the centre of mass of the plasticine.

(d) Calculate m, the mass of the plasticine, using the equation:

$m = Rx/y$ where R = 60 g.

(e) Repeat steps **(c)** and **(d)** using different values of x to obtain a total of three sets of results.

(f) Calculate and record the average value for m.

(g) Calculate the density of the plasticine using the equation:

density = mass/volume.

(h) By means of clearly labelled diagrams and a brief description, explain how you could find the volume of some plasticine if you were supplied with a measuring cylinder and water. (You are **not** required to carry this out.)

3 In this experiment you are, as accurately as possible, to find the volume, V, of liquid which a boiling tube will hold.

Record all of your observations and answers on page 6 of the Answer Booklet. It is important to record **all** your readings **and** the calculations used to obtain the results.

Method 1

The measuring cylinder supplied is too large to directly measure small volumes of liquid accurately.

Using the measuring cylinder and the water provided, determine as accurately as possible a value for V_1, the volume of the boiling tube.

Method 2

(a) Measure and record h, the height of the boiling tube. (See Fig. 3.1.)

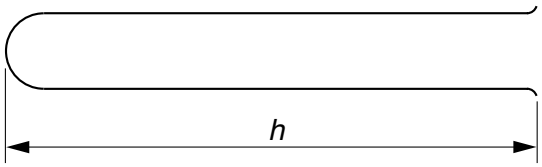

Fig. 3.1

(b) Use the 1 m length of string to obtain **as accurately as possible** a value for c, the circumference of the main part of the boiling tube. Record this value.

(c) If the boiling tube is regarded as a uniform cylinder, the volume V_2 is given by the following equation.

$$V_2 = \frac{c^2 h}{4\pi}$$

Calculate V_2.

(d) Which of the two values, V_1 or V_2, do you think is the better estimate of V? Explain your answer.

4 In this experiment you are to investigate the change in the direction of a reflected ray when a plane mirror is rotated.

Record all of your observations and answers on page 6 of your Answer Booklet.

Carry out the following instructions, using the ray trace sheet (page 7 of the Answer Booklet) on the pin board provided and referring to Fig 4.1.

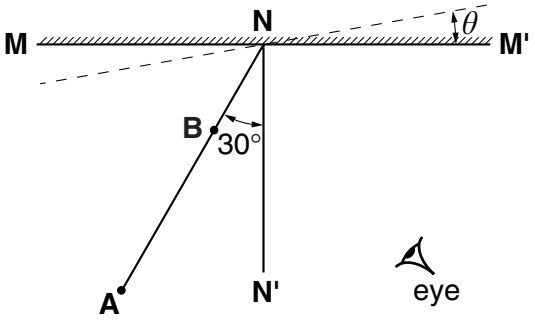

Fig. 4.1

(a) Place the mirror on the line **MM'** so that its mid-point is approximately at the point **N.**

(b) Push a pin into the surface at point **A**, and a second pin at point **B**.
View the images of the two pins from the position indicated by the eye. Move your eye until the images appear exactly one behind the other. Place a third pin between your eye and the mirror so that it hides the images of the other two pins.

(c) Label the third pin position **C**.
Remove the mirror and the pins. Use a rule to draw a thin line **NC**.
Measure and record *r*, the angle between **NN'** and **NC**.

(d) Now place the mirror on the dotted line, so that the mirror has been rotated through an angle $\theta = 10°$ to the new position indicated on Fig. 4.1.
Repeat the procedure in **(b)**.
Label the third pin position as **D**.
Measure and record *s*, the angle between **NN'** and **ND**.

(e) Repeat step **(d)** for angles $\theta = 20°$ and $\theta = 30°$. You will need to draw in construction lines to show the positions of the mirror each time. Mark the new positions of the third pin as **E** and **F**. Measure and record in the table the new values of *s* (the angles between **NN'** and **NE** and between **NN'** and **NF** respectively).

(f) For each value of θ, calculate the value of $(s - r)$ and enter it in the table.

(g) Write a conclusion about the relationship between $(s - r)$ and θ. Justify your conclusion with an example from the table.

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